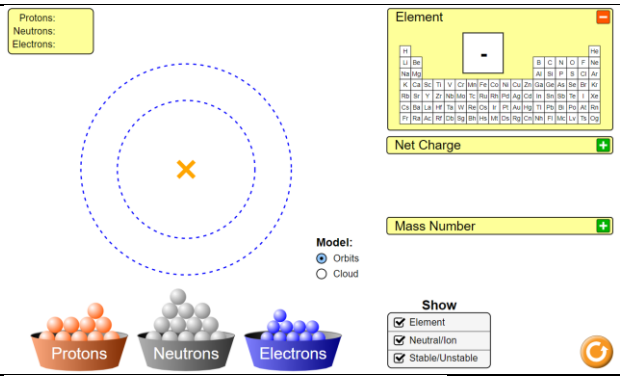
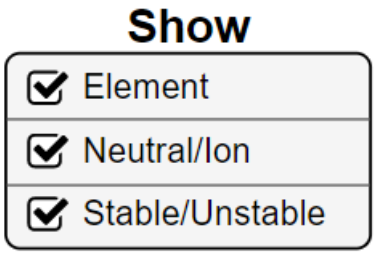
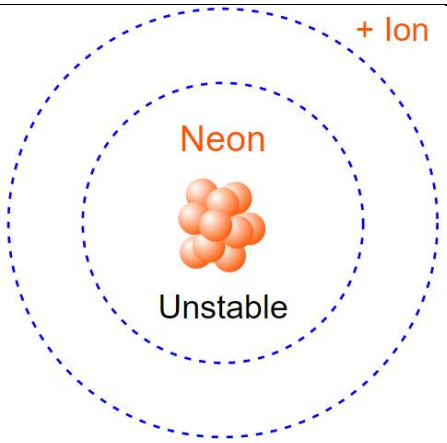
Name _____

Atomic Structure

Your Tasks (Mark these off as you go)

- ☐ Explore what makes an atom stable
- ☐ Explore what make an atom neutral
- ☐ Explore atoms with charges
- ☐ Identify the particles that contribute to the mass of an atom
- ☐ Interpret nuclear notation
- ☐ Test your understanding
- ☐ Receive credit for this lab

❑ Explore what makes an atom stable

Navigate to the "Build an Atom" simulator https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html?screens=1	
Check the Stable/Unstable option	
Drag and drop all 10 protons to the "x". Then, drag and drop neutrons until the atom is "Stable". Record the number of neutrons required to stabilize an atom with 10 protons. Repeat this process with the different numbers of protons. Record your results below.	

Number of protons	Neutrons required to make a "stable" atom
10	

What particles go in the center of the atom. What is the center of the atom called?

What changes the identity of at the atom? Changing the number of protons or changing the number of neutrons?

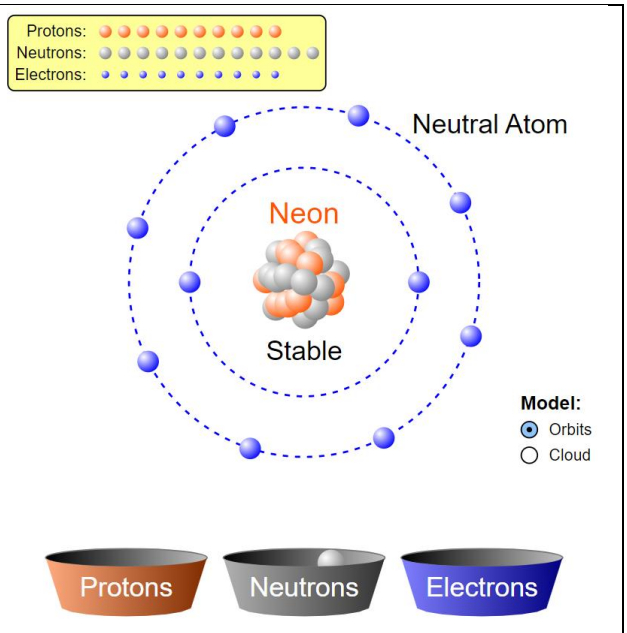
What makes an atom "stable"

❑ Explore what makes an atom neutral

Drag and drop all 10 protons to the "x".
Then, drag and drop neutrons until the atom is "Stable".

Now, drag and drop electrons until the at is "Neutral". Record how many electrons are required to make an atom with 10 protons neutral.

Repeat this process for stable atoms with different numbers of protons.



Number of protons	Neutrons required to make a "stable" atom	Electrons required to make a neutral atom
10		

What particles surround the center of the atom?

What is the charge on a proton?

What is the charge on an electron? What makes an atom neutral?

❑ Explore atoms with charges

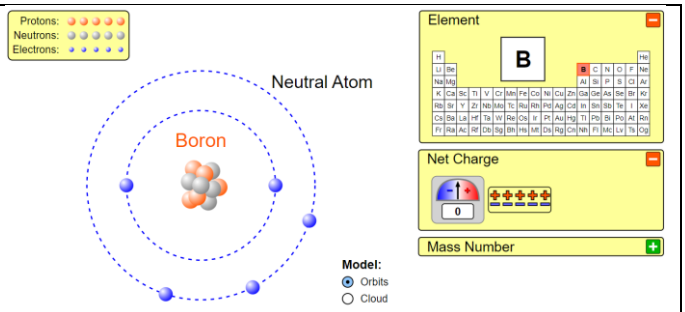
Create an atom by dragging and dropping 5 protons, 5 neutrons, and 5 electrons.

Display the "Net Charge" window.

Add more electrons so the atom has more than 5. Record the number of protons, neutrons, electrons, and the net charge.

Remove electrons so the atom has less than 5. Record the number of protons, neutrons, electrons, and the net charge.

Repeat the above process for different numbers of protons, neutrons, electrons. Each time record the Net Charge and the identity of the atom.



Atom	Protons	Neutrons	Electrons	Net Charge

What is a rule for making an atom with a positive charge?

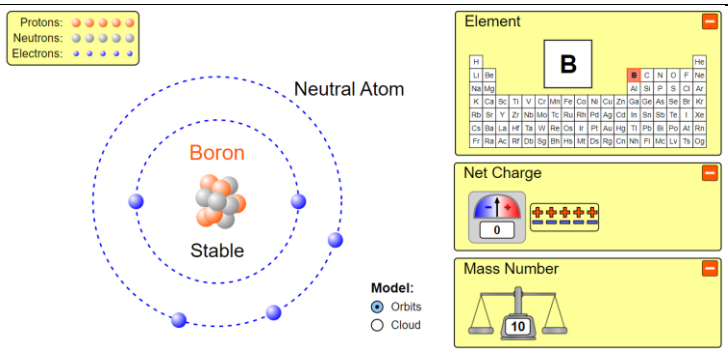
What is a rule for making an atom with a negative charge?

Do neutrons affect the overall charge of the atom?

Consider the atoms with the following protons and electrons. For each atom, determine its identity and the net charge.

Atom	**Protons**	**Electrons**	**Charge**
	3	2	
	4	2	
	5	2	
	7	10	
	8	10	
	9	10	
	10	10	

❑ Identify the particles that contribute to the mass of an atom

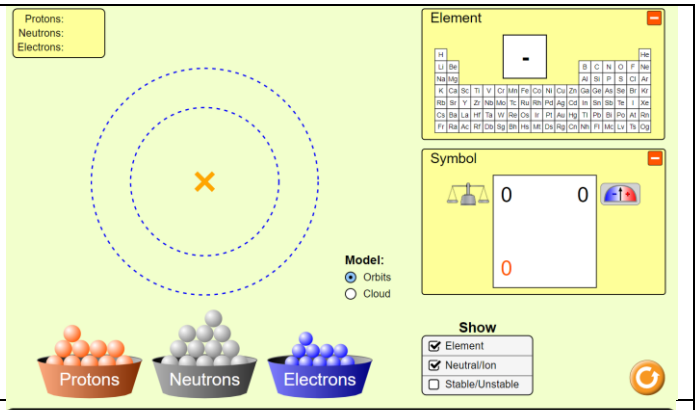
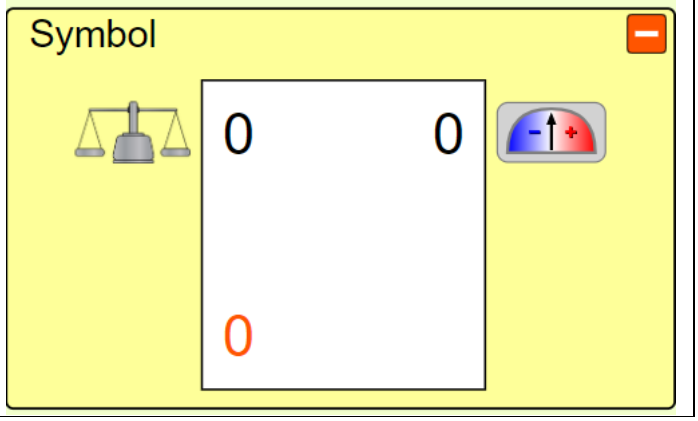
Reset the simulator	
Create a stable, neutral Boron atom by dragging and dropping 5 protons, 5 neutrons, and 5 electrons. Display the “Mass Number” window. Record the mass of Boron in the table below. Add an electron to your Boron atom, re-record the mass. Take away two electrons from your Boron atom, re-record the mass Take away a neutron. Indicate the atom, then record the number of protons, neutrons, electrons, and the mass. Take away a proton. Indicate the atom, then record the number of protons, neutrons, electrons, and the mass. Drag and drop different amounts of protons, neutrons, and electrons, to create at least 3 more additional atoms. Record the identify of the atom, along with the number of protons, neutrons, electrons, and mass for each.	

Atom	Protons	Neutrons	Electrons	Mass
Boron	5	5	5	10
Boron	5	5	6	
Boron	5	5	4	

Which particles determine the mass of the atom?

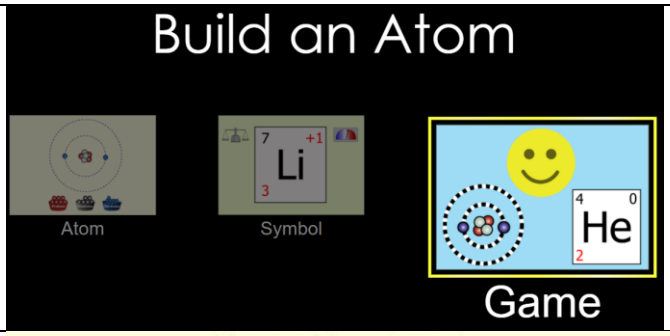
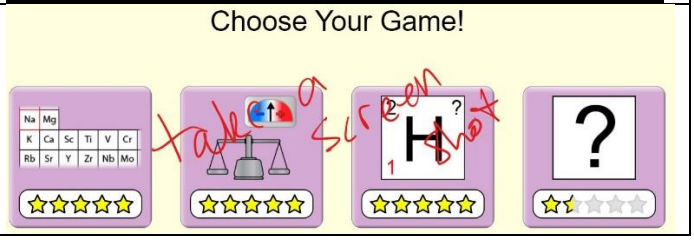
Complete the table below by filling in the boxes shaded red. Assume each atom is neutral.				
Atom	**Protons**	**Neutrons**	**Electrons**	**Mass**
Carbon	6			12
Carbon	6			14
	12			25
	11	12		
Argon				40
Zinc				

❑ Interpret nuclear notation

Open the Symbol screen https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html?screens=2	
Create some atoms by dragging and dropping protons, neutrons, and electrons. Indicate what each part of the symbol represents below. Describe how you can determine the value of each part. For example, to find the mass number you can add the protons and neutrons.	

	Representation	Describe how you can determine its value
A		
B		
C		
D		

❑ Test your understanding

Navigate to the Build an Atom game https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html	
Play levels 1, 2, 3, 4. Once you have completed all four levels, take a screenshot of your results and paste it below.	

Paste a screenshot of your game results below.

❑ Receive Credit for this lab

Each group member must complete and submit their own lab to receive credit